Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 3/22/16 at 9:00 a.m.

Objective: Provide advice to the Water Operations Management Team (WOMT) and National Marine Fisheries Service (NMFS) on measures to reduce adverse effects from Delta operations of the Central Valley Project and the State Water Project on salmonids and green sturgeon. DOSS will work with other technical teams. DOSS notes and advice can be found at: http://www.westcoast.fisheries.noaa.gov/central_valley/water_operations/doss.html.

DWR: Aaron Miller, Rhiannon Mulligan, Kevin Reece, James Edwards, Mike Ford
Reclamation: John Hannon
NMFS: Jeff Stuart, Kristin McCleery
CDFW: Bob Fujimura, Duane Linander
SWRCB: Chris Carr, Laurel Karren, Brittany Kammerer

Agenda Items

1. Agenda review and introductions
2. RPA Implementation review
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring: Salvage
6. Fish Monitoring: Hatchery winter-run Chinook acoustic-tracking
7. Fish Monitoring: RSTs/trawls/seines
8. Recent or Upcoming Hatchery Releases
9. DOSS Estimates of Fish Distribution and Entrainment Risk
10. DOSS Advice
11. Next DOSS meeting

Agenda Item 2.
RPA Implementation Review

Delta RPA Actions that may affect operations during March:

Action IV.1.2[1] (DCC gate operations):

- DCC gates have been closed since 12/15/15.

Action IV.2.3[2] (OMR Flow Management)

- No triggers exceeded over past week.
- OMR limit of -5,000 cfs is in effect

[1] For details, see pages 62-66 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf
[1] For details, see pages 74-79 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf

Agenda Item 3.

Current Operations (3/22/16)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	3,000*	Jones Pumping Plant	3,400
Reservoir Releases (cfs)			
Feather - Oroville	800**	American - Nimbus	8,150***
		Sacramento - Keswick	20,000****
		Stanislaus - Goodwin	200
		Trinity - Lewiston	300
Reservoir Storage (in TAF)			
San Luis (SWP)	639	San Luis (CVP)	393
Oroville	2,886	Shasta	3,924
New Melones	577	Folsom	646
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	62,370
Outflow Index (cfs)	~59,700	San Joaquin River at Vernalis (cfs)	2296
E:I	7.0% (14-day avg.)	X2	<56 km

*SWP plans to decrease inflows to CCFB as the San Joaquin River flow diminishes over the next week.
**Oroville reservoir storage is encroached on the flood control curve by ~100 TAF; releases may have to be increased sometime this week pending discussions with the USCOE.
*** Nimbus will be ramping down releases to 5,450 cfs by 3/25/16.
****Shasta releases are targeted to ramp down to 5000 cfs by 3/28/16.

OMR as of 3/19/16:

	USGS gauges (cfs)	Index[3] (cfs)
5-day	-5080	-5004
14-day	-4846	-4986

The daily OMR Index on 3/21/16 was -5,000 cfs.

Review of factors controlling Delta exports for the period 3/15/16 to 3/22/16:

[3] Beginning 2/16/16, the OMR Index values reported in the DOSS notes were calculated using an OMR Index equation that no longer includes (per the original intent of the index equation) the Contra Costa Water District's Rock Slough diversion in the export term. Beginning February 2016, the OMR Index values reported in the monthly OMR reports on the "CVO Reports" website (http://www.usbr.gov/mp/cvo/index.html) were calculated using this adjusted equation without the Rock Slough diversion.

- *Tuesday (3/15/16) – Tuesday (3/22/16):* -5,000 cfs OMR limit per both NMFS BiOp and 3/8/16 FWS determination (which continued the -5,000 cfs limit in the 2/10/16 FWS determination).

Weather forecast indicates dry conditions for the next two weeks.

Agenda Item 4.
Smelt Working Group
The SWG met on Monday, 3/21/16 at 10am. Bartoo (FWS) provided the following SWG meeting summary:

> The Working Group reviewed current Delta Smelt distribution, salvage data, and Delta conditions. The Working Group agreed that the relative risk of entrainment to adult Delta Smelt likely has decreased. Members noted that spawning likely is well underway, and adults are most likely holding their positions, rather than continuing migration. In light of this, the group's discussions primarily focused on the entrainment risk to larval and juvenile Delta Smelt.
>
> The Working Group described the risk of entrainment under the Service-provided advice framework. Under this framework the relative risk of entrainment for OMR flow ranges is discussed and assessed. For the current week, the risk of entrainment of larval and juvenile Delta Smelt for each of the flow ranges is characterized as follows:
>
> • -1250 to -2000 cfs has a low risk of entrainment,
> • -2000 to -3500 cfs has a low-medium risk of entrainment,
> • -3500 to -5000 cfs has a medium-high risk of entrainment.
>
> The Working Group is following guidance for entrainment protections from both Action 2 (adult Delta Smelt) and Action 3 (juvenile Delta Smelt). The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions, and will meet again on Monday, March 28, 2016 at 10 am.

SWG meeting notes are available at: http://www.fws.gov/sfbaydelta/cvp-swp/smelt_working_group.cfm.

Agenda Item 5.
Fish Monitoring: Salvage[4]

Fujimura (CDFW) provided the following summaries of salvage and loss at the SWP and CVP fish collection facilities. The salvage figures were generated on the CDFW salvage monitoring web-page: http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx.

[4] Salvage data reported in this section represent the total estimated and expanded salvage based on the number of fish observed at the fish collection facility. For example, if one steelhead is observed in the typical ½-hour sampling period within a 2-hour operation period, the single steelhead is expanded to a salvage of four.

DOSS Weekly Salvage Update

Reporting Period: March 14-March 20, 2016

Prepared by Bob Fujimura on March 21, 2016 15:45

Preliminary Results -Subject to Revision

Criteria	14-Mar	15-Mar	16-Mar	17-Mar	18-Mar	19-Mar	20-Mar	Trend	
Loss Densities									
Wild older juvenile CS	0	0	0	0	0	0	0	→	0
Wild steelhead	1.31	2.85	1.1	0.17	0.19	0	1.23	↗	0.98
Exports									
SWP daily export	6,485	7,336	8,981	8,940	7,219	7,189	7,362	↗	7,645
CVP daily export	6,765	6,747	6,809	6,782	6,780	6,777	6,776	→	6,777
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%
CVP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%

Loss Density = fish lost/TAF; water export = AF; Trend = compared to previous week; wild = adipose fin present

Loss = estimated number of fish lost at the CVP and SWP Delta export facilities based on estimated salvage (see below)

Reduced counts = percentage of time that routine salvage sample time were less than 30 min per 2 hours of salvage and export operations

Yellow highlighted dates indicate TFCF salvage outage occurred

Chinook Salmon Weekly/Season Salvage and Loss

Combined salvage and loss for both CVP and SWP fish facilities

Race determined by size at date of capture; hatchery = adipose fin missing;

		Weekly Total			Season Total	
Category		Salvage	Loss	Trend	Salvage	Loss
Wild						
	Winter Run	0	0	→	28	51
	Spring Run	28	18	↗	44	28
	Late Fall Run	0	0	→	44	166
	Fall Run	8	5	↗	68	76
	Unclassified	0	0	↘	14	NC
	Total	**36**	**23**		**198**	**321**
Hatchery						
	Winter Run	4	3	→	209	610
	Spring Run	8	5	↗	8	5
	Late Fall Run	0	0	→	93	298
	Fall Run	0	0	→	1	4
	Unclassified	0	0	→	0	0
	Total	**12**	**8**		**311**	**917**

Trend = weekly loss per race; Salvage = estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time

NC = can not be calculated

Steelhead Weekly/Season Salvage and Loss

Combined salvage and loss for both CVP and SWP fish facilities

	Weekly Total			Season Total	
Category	Salvage	Loss	Trend	Salvage	Loss
Wild	36	97	↗	86	183
Hatchery	342	1,101	↗	1,128	2,993
Total	**378**	**1,199**		**1,214**	**3,176**

State Water Project loss = salvage x 4.33; Central Valley Project loss = salvage x 0.68

Figure 1. DOSS weekly salvage update for the reporting period 3/14/16-3/20/16.

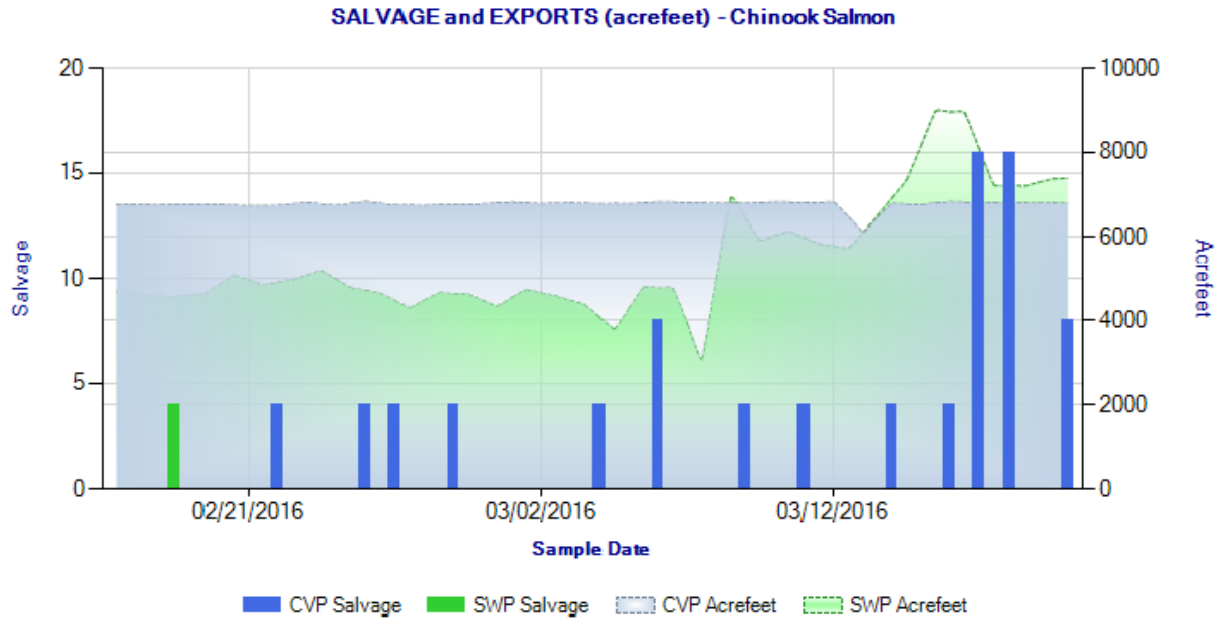


Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during February 17, 2016 through March 20, 2016.

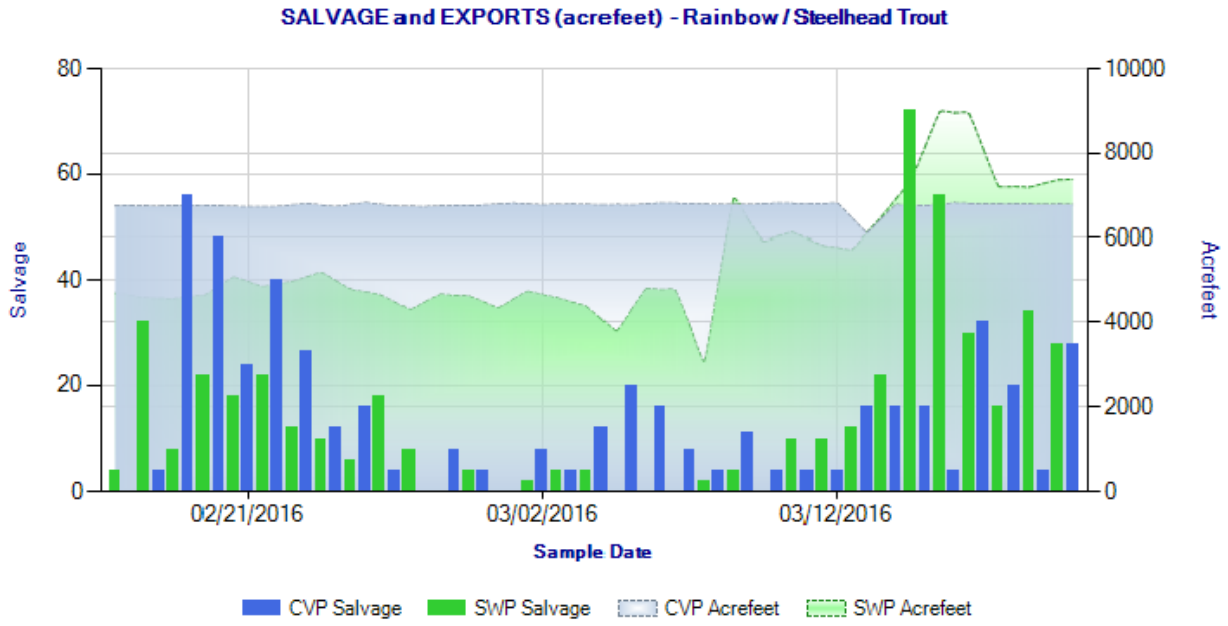


Figure 3. Daily salvage of steelhead and water exports from the state and federal fish salvage facilities during February 17, 2016 through March 20, 2016.

Preliminary salvage report for Monday, 3/21/16:

- 12 wild Chinook (all at the CVP; 4 winter-run-sized and 8 spring-run-sized)
- 156 clipped Chinook (all at the CVP, most from the San Joaquin River Restoration Program release of hatchery spring-run released mid March near the Merced River on the San Joaquin)

- 32 Clipped steelhead (8 at the CVP, 24 at the SWP)

Coded-wire-tag recoveries

Mulligan (DWR) provided the following summary of coded-wire-tag recoveries at the SWP and CVP fish collection facilities. The cumulative loss of the hatchery winter-run Chinook group (released by Livingston Stone National Fish Hatchery (LSNFH) on 2/17/16 to 2/18/16) is 11.19, 0.003% of the number released. The most recent salvage of LSNFH hatchery winter-run Chinook occurred on Monday, 3/14/16. The cumulative loss of the third spring-run Chinook surrogate group (released from Coleman National Fish Hatchery on 1/12/16) continues to hold at 0.412%, near the 0.5% OMR trigger threshold under Action IV.2.3. Loss of Chinook within any spring-run Chinook surrogate group has not occurred since 2/12/16.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2015/2016

Release Date	CWT Race	Hatchery	Release Site	Release Type	Confirmed Loss	Number Released[1]	Total Entering Delta	% Loss of Number Released
6/11/2015 to 6/12/2015	LF	Coleman NFH	Balls Ferry Boat Ramp, Sacramento River	Production	0.00	434,227	n/a	0.000
12/9/2015	LF	Coleman NFH	Battle Creek	Production	305.22	261,213	n/a	0.117
12/11/2015	LF	Coleman NFH	Battle Creek	Spring Surrogate	128.05	77,000	n/a	0.166
12/22/2015	LF	Coleman NFH	Battle Creek	Spring Surrogate	170.59	68,000	n/a	0.251
1/12/2016	LF	Coleman NFH	Battle Creek	Spring Surrogate	278.65	67,700	n/a	0.412
2/17/2016 to 2/18/2016	W	Livingston stone NFH	Sacramento River	Winter Run Production	11.19	420,006	155,400	0.003
3/14/2016	F	Coleman NFH	Battle Creek	Fall run Production	0.00	864,486	n/a	0.000
3/18/2016	S	Feather River Hatchery	San Joaquin River	River restoration program	2.54	105,000	n/a	0.002
3/22/2016	F	Coleman NFH	Battle Creek	Fall run Production	0.00	1,374,000	n/a	0.000

UNCONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2015/2016

Facility	Unknown CWT Loss[5]	Unread CWT Loss[6]	Unknown Hatchery Loss[7]	Acoustic Tag Loss[8]	Number of Unassigned CWTs[9]
SWP	18.16	0.00	0.00	0.00	0
CVP	2.88	0.00	0.00	0.00	0
TOTAL	21.04	0.00	0.00	0.00	0

SWP and CVP adipose-fin clipped Chinook lost from 12/25/2015

[1]Number released with the adipose-fin clipped and a coded-wire tag (CWT).

[2]% Loss of Number Released = (Confirmed Loss/Number Released)*100.

[3]% Loss of Total Entering Delta= (Confirmed Loss/Total Entering Delta)*100.

[4]Date of first and last loss accounts for all CWT loss even those from special studies where salvage and loss=0.

[5]Adipose-fin clipped Chinook was observed during fish count, but tag code could not be determined (e.g., damaged tag, lost tag, no tag, or Chinook accidentally released).

[6]Adipose-fin clipped Chinook was collected during fish count and has not been processed yet.

[7]CWT has been read, but hatchery release information not yet available.

[8]Adipose-fin clipped Chinook released due to presence of sutures.

[9]CWT cannot currently be assigned to a salvage record with certainty since the CWT was lost and then found. CWT may be assigned to a salvage record if new information is available.

** Information not yet available.

DWR-DES Revised 03/22/2016

Preliminary data from DFW, DWR, FWS, and Reclamation; subject to revision.

Agenda Item 6.

Fish Monitoring: Hatchery winter-run Chinook acoustic-tracking

LSNFH released approximately 420,000 hatchery winter-run Chinook at Bonnyview Bridge in Redding – one group on 2/17/16 and the other group on 2/18/16. 285 of each release group (for a total of 570) were acoustic-tagged with JSATS tags and NOAA's Southwest Fisheries Science Center (SWFSC) is tracking movement of these acoustic-tagged fish past eight "real-time" receiver locations from Redding to Middle River.

Highlights from the latest (as of 11:55 pm on 3/20/16) acoustic-tracking data from Arnold Amman (SWFSC) are provided below.

- Three new fish detected at Tower Bridge since the last update on Friday, 3/18. One of those fish traveled from Colusa to Tower Bridge (142 km) in 1.62 days, which is an average speed of 88 km/day! The other two fish traveled at similar speeds.

- Bend Bridge flows are still moderately high and are going to stay above 24,000 cfs for the next few days.

- The fact that the three new fish detected at Tower Bridge were detected at all operating real time receivers at flows of ~30,000 cfs suggests that detection efficiency is high despite the moderately high flows.

- 49% of the acoustic-tagged hatchery winter-run Chinook have passed the Tower Bridge receiver in Sacramento.

Agenda Item 7.
Fish Monitoring: RSTs/trawls/seines

The following table presents fish monitoring data. Unless otherwise noted, reported sizes are fork length. See also:
http://www.water.ca.gov/swp/operationscontrol/calfed/calfedmonitoring.cfm.

Location	Chipps Is. Midwater Trawl[A, E]	Station 902/Jersey Pt./Prisoners Pt. Trawls[A]	Sacramento Trawl[A]	Beach Seines[A]	Knights Landing RST[B]	Tisdale RST[C]	GCID RST[D]	Mossdale Kodiak Trawl[A]
Sample Date	3/14, 3/16[E]	902: 3/18 Jersey Pt: 3/15, 3/17 Pris. Pt: 3/14, 3/16	3/14, 3/16, 3/18	3/15, 3/17	3/13-3/21	3/13-3/20	No sampling since 3/4	3/14, 3/16, 3/18
FR Chinook		11	120	177	244	167		3
WR Chinook	1		2			1		
SR Chinook	2			5	11	9		
LFR Chinook								
Ad-Clipped Chinook	8		2	2	3	1		
Chinook Adult								
Steelhead (wild)	1	1						
Steelhead (ad-clip)	4	3			4			
Green Sturgeon								
Delta Smelt		2						
Splittail	2							
Longfin Smelt								
Flows (avg. cfs)					25,700	32,551		
W. Temp. (avg. °F)					54.3	54.5		
Turbidity (avg. NTU)					142.3	198.5		

[A] Data reported in the 3/13 to 3/19 DJFMP sampling summary
[B] Sampling period was from 3/13 at 9:15 am to 3/21 at 9:30 am. Cones were modified to 50% catch throughout sampling period.
[C] Sampling period was from 3/13 at 4:00 pm to 3/15 at 5:00pm, and 3/16 at 10:30 am to 3/20 at 5:00 pm. Traps not operating overnight on 3/15 due to debris mat/log jam. Cones were modified to 50% catch throughout sampling period.

[D] On 3/4 at 9:00 am, the GCID trap was pulled from the bypass channel to avoid the expected peak in high flows and heavy debris.
[E] Normally there are 3 days of sampling at Chipps Island, this week only 2 days of sampling occurred.

Monitoring Summary for DCC and Early Warning surveys: This table provides recent monitoring information not included in the 3/13 to 3/19 DJFMP sampling summary and thus not captured in the table above.

Location	Prisoners Pt. Trawls	Sacramento Trawl
Sample Date	3/21	3/21
FR Chinook	3	21
WR Chinook		1
SR Chinook		3
Ad-Clipped Chinook		1
Delta Smelt	1	

Agenda Item 8.
Recent or Upcoming Hatchery Releases

Coleman National Fish Hatchery will release approximately 1,374,000 brood year 2015 fall-run Chinook salmon (25% marked with adipose fin clip and coded wire tag) into Battle Creek on Tuesday, 3/22/16. Last Friday[5], 3/18/16, approximately 105,000 hatchery spring-run CS (SRCS) were released at Hills Ferry on the San Joaquin River as part of the SJRRP. 45,000 of these fish are from the conservation hatchery on the San Joaquin River, the remaining 60,000 fish are from the Feather River Fish Hatchery (FRFH). All fish are clipped and have CWTs indicating their source hatchery. Releases of 1 million non-SJRRP hatchery production SRCS from the FRFH is scheduled to occur this week (3/24/16) in the Feather River. A second release is tentatively scheduled for 4/14/16 and 4/15/16.

Agenda Item 9.
DOSS Estimates of Fish Distribution and Entrainment Risk

DOSS estimates of the current distribution of listed Chinook, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns. As monitoring information is received, listed species distribution will be updated and included in the following table.

Location	Yet to Enter Delta (Upstream of Knights Landing)	In the Delta	Exited the Delta (Past Chipps Island)
Young-of-year (YOY) winter-run Chinook salmon[1]	<1% (Last week: same)	50% - 70% (Last week: 60% - 80%)	30% - 50% (Last week: 20% - 40%)

[5] After the DOSS call, it was reported that the SJRRP SRCS were actually released one day early, on Thursday, 3/17/16.

*Young-of-year (YOY) spring-run Chinook salmon**	5% - 10% (Last week: 5% - 20%)	55% - 60% (Last week: 50% - 75%)	30% - 40% (Last week: 20% - 30%)
Hatchery winter-run Chinook salmon	<5% (Last week: 5% - 15%)	45% - 65% (Last week: 35% - 65%)	30% - 50% (Last week: 30% - 50%)

*Once hatchery fall-run releases (75% of which are unmarked) occur upstream of a monitoring location, DOSS assumes that many of the unclipped spring-run-sized Chinook observed in monitoring may be unmarked fall-run Chinook that fall into the spring-run size range. Because Coleman National Fish Hatchery released 864,400 BY 2015 fall-run Chinook into Battle Creek on 3/14/16, and plans to release another 1,374,000 BY 2016 fall-run Chinook on 3/22/16, this assumption is now.

Rationale for changes in distribution

Wild winter-run Chinook: The fraction of wild winter-run upstream of the Delta stayed the same since DOSS thinks a few stragglers still remain upstream. The increase in the fraction of wild winter-run having exited the Delta is based on the very high flows and seasonal timing (historical peak winter-run outmigration from the Delta is in March), both of which DOSS considers conducive to winter-run outmigration. While just one winter-run-sized wild Chinook was reported in the Chipps Trawl, low trawl efficiency and a low winter-run population may mean that the Chipps trawl may not collect many winter-run this year, even during peak outmigration. The decrease in the fraction of wild winter-run remaining in the Delta was due to DOSS's estimate that many more winter-run exited the Delta than entered.

Wild spring-run Chinook: The decrease in the fraction of wild spring-run upstream of the Delta is based on the observations of spring-run-sized Chinook seen in Sacramento River monitoring upstream of the Delta last week, as well as high flows and turbidities (conditions conducive to salmonid movement). The increase in the fraction of wild spring-run having exited the Delta is based on the very high flows expected to move some fish out of the Delta. Several spring-run-sized wild Chinook were reported in the Chipps Trawl, DOSS assumed that some of the 50-75% of spring-run estimated to be in the Delta last week moved out with the continued high Delta outflow associated with the recent storm.

Hatchery winter-run Chinook: The decrease in the fraction of hatchery winter-run upstream of the Delta is based on: (a) the very few acoustic-tagged hatchery winter-run Chinook detected passing the Tower Bridge receivers last week, despite high flows and turbidities (conditions conducive to salmonid movement), and (b) the observations of hatchery Chinook (likely from the LSNFH winter-run release based on size) seen in the Sacramento Trawl and Sacramento River monitoring upstream of the Delta last week[6], and (c) recent high flows and turbidities (conditions conducive to salmonid movement). With the recent high flows, only an additional 3 fish were detected (~2% of tagged fish releases) at the Tower Bridge receiver, which suggests that most of the hatchery fish have left the upper river and entered the Delta. The proportion of the population entering the Delta from upriver has increased the proportion residing within the Delta

[6] Items (a) and (b) may seem contrary at first glance ("few fish" and "more fish" both indicate a distribution shift?), but DOSS generally makes changes to distribution estimates based on "few fish" observed only when "few fish" are observed after conditions conducive to movement (the case this week; i.e. few wild fish observed despite the recent storms) or when "few fish" are observed over multiple weeks during a time when (based on historical migration timing) the run of interest is expected to be moving.

while the rate of fish exiting the Delta appears to have diminished based on the Chipps trawl data. The proportion of the population remaining in the Delta and those which have exited the Delta are covered by the broad ranges of estimates discussed by the DOSS group.

DOSS Feedback on Entrainment Risk

DOSS provides weekly entrainment risk outlooks by considering (a) two different categories of entrainment risk based on listed fish distribution and (b) factors that influence their potential for entrainment. The two entrainment risk categories considered include:

- **Interior Delta Entrainment Risk**- fish in the Sacramento River that have the potential to be entrained into the Interior Delta through the Delta Cross Channel (when open) and/or Georgiana Slough; and
- **CVP/SWP Facilities Entrainment Risk**- fish in the Interior Delta that have the potential to be entrained into the CVP/SWP facilities.

Influencing factors considered include:

- **Exposure Risk** (both categories)- estimated scale (low, medium, high) of fish anticipated to be in vicinity of an entrainment risk,
- **Routing Risk** (Interior Delta Entrainment Risk)- estimated scale (low, medium, high) that flow split conditions could result in fish migrating into the interior delta instead of remaining in main channel, and
- **OMR/Export Risk** (CVP/SWP Facilities Entrainment Risk)- for fish in the Interior Delta, estimated scale (low, medium, high) that OMR and/or Export levels could result in entrainment associated with CVP/SWP facilities.

To provide an overall assessment of entrainment risk, the estimated current status of these influencing factors are described below for each of the entrainment risk categories.

Interior Delta Entrainment Risk for listed salmonids in the Sacramento River over the next week:

Assessments of routing risks are the same compared to last week's assessments based on an expectation of continued high Sacramento River flow past Georgianna Slough over the upcoming week.

- **Exposure Risk:** MEDIUM *(last week: same)*
  - High flows and turbidities from recent rains are cues for continued salmonid movement.
- **Routing Risk:** LOW *(last week:same)*
  - Very high river flows are expected to mute the tidal effects at Georgiana Slough (reducing the risk of routing into Georgiana Slough).
- **Overall Entrainment Risk:** LOW to MEDIUM *(last week: same)*

CVP/SWP Facilities Entrainment Risk for listed salmonids in the Interior Delta over the next week:

Assessments of entrainment risks are the same compared to last week's assessments based on an expectation of continued high inflows to the Delta over the upcoming week and associated in-Delta conditions.

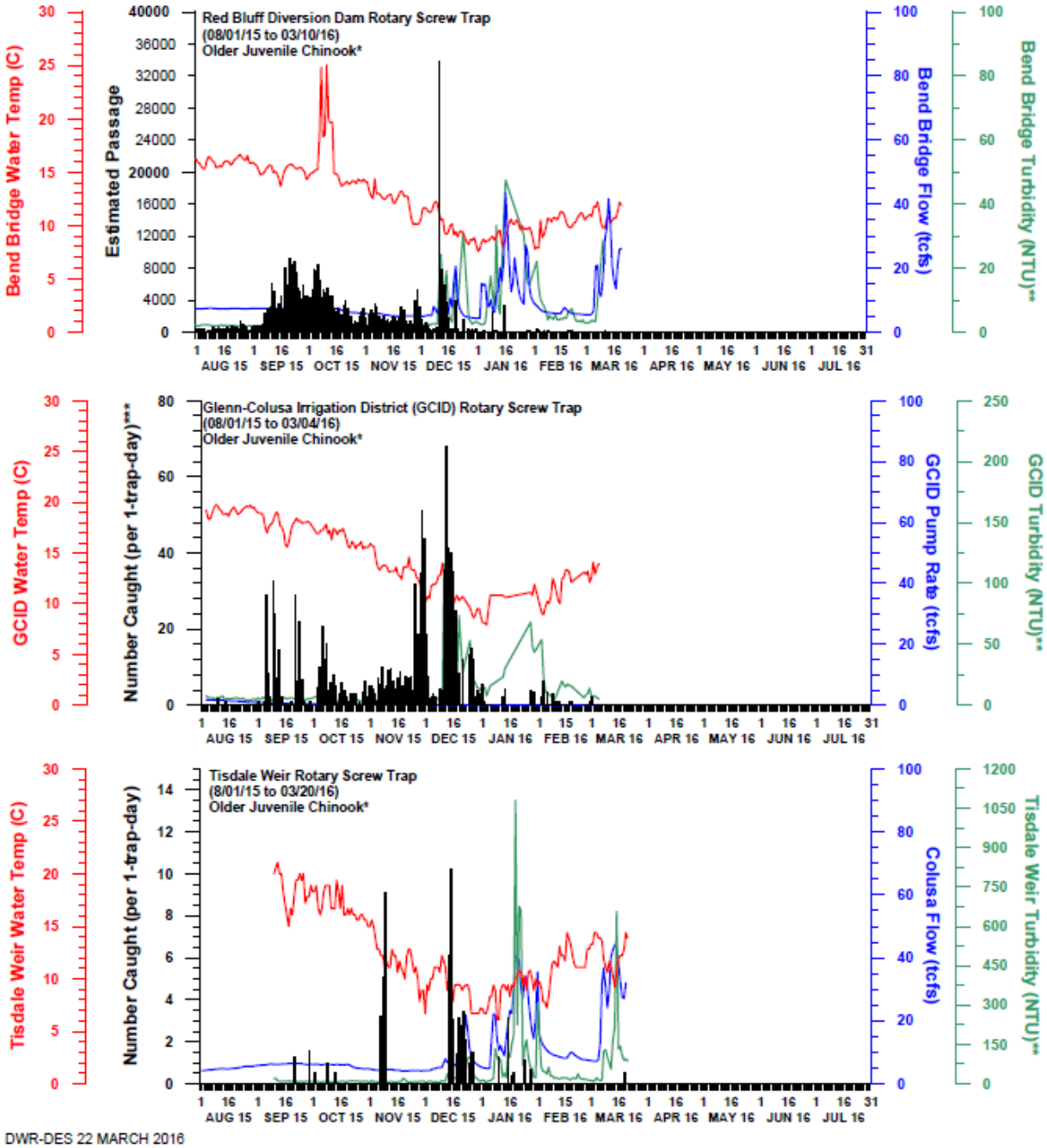
- **Exposure Risk:** MEDIUM to HIGH *(last week: same)*
  - Natural-origin individuals from listed runs are expected to have previously migrated into and be rearing within the Interior Delta; a substantial fraction of the hatchery winter-run production is estimated to be present in the Delta.
- **OMR/Export Risk:**
  - OMR -2,500 cfs to -3,500 cfs: LOW *(last week: same)*
  - OMR -3,500 cfs to -5,000 cfs: MEDIUM *(last week:same)*
- **Overall Entrainment Risk:**
  - OMR -2,500 cfs to -3,500 cfs: LOW to MEDIUM *(last week:same)*
  - OMR -3,500 cfs to -5,000 cfs: MEDIUM *(last week:same)*

Agenda Item 10.
DOSS Advice to WOMT and NMFS: None

Agenda Item 11.
Next Meeting: The next DOSS conference call will be on 3/29/16 at 9am.

The following graphs were provided by DWR for Chinook salmon and steelhead observed at monitoring locations in the Sacramento and San Joaquin rivers and Delta. Also available at: http://www.water.ca.gov/swp/operationscontrol/calfed/calfedmonitoring.cfm

NUMBER OF UNMARKED OLDER JUVENILE CHINOOK MEASURED IN THE SACRAMENTO RIVER

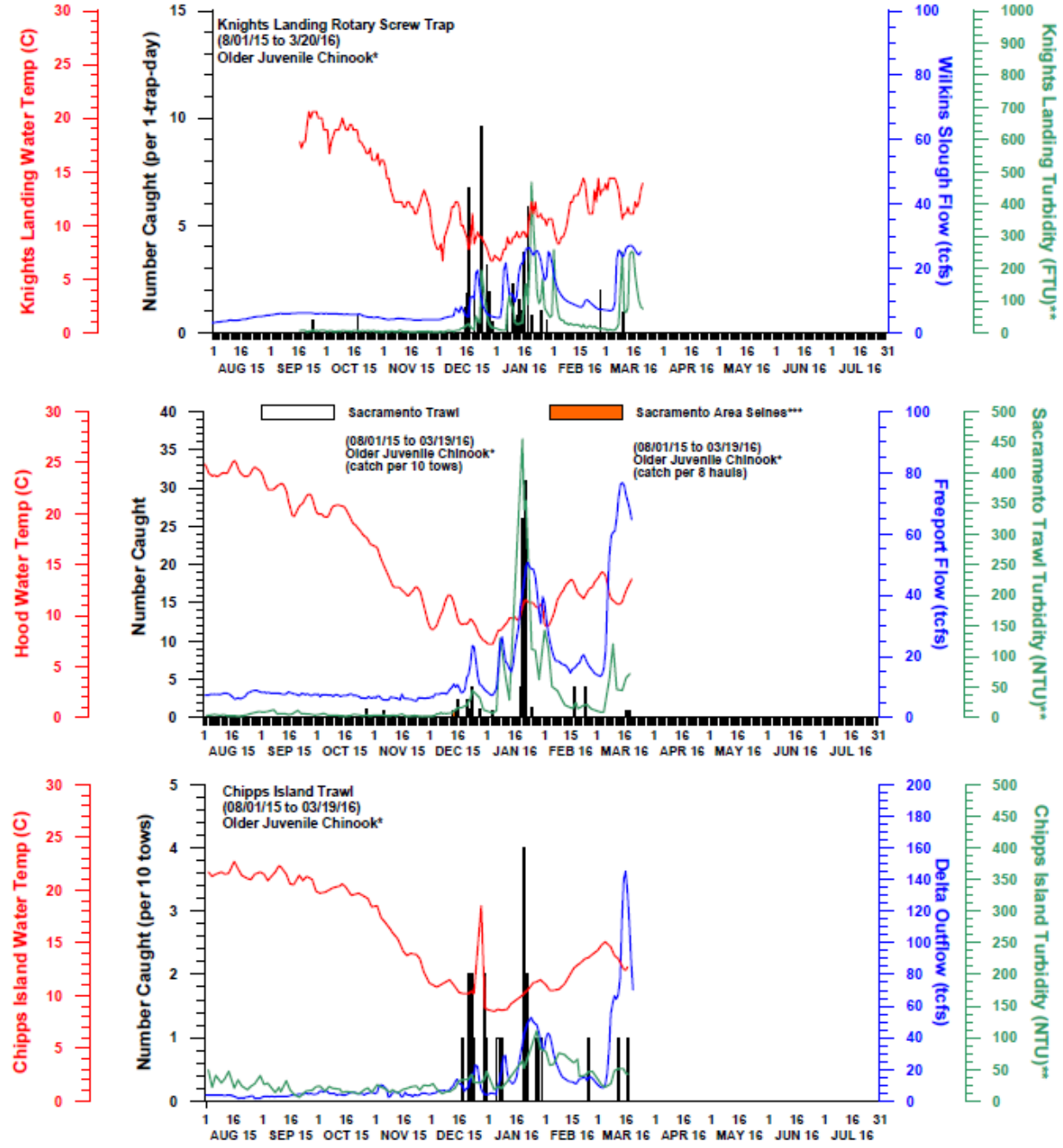


DWR-DES 22 MARCH 2016
Preliminary data from DFW, FWS, GCID, and CDEC; subject to revision.

*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Frank Fisher model) for which a race is assigned on a given sampling date.

-Tisdale: 12/12/2015-12/13/2015 there was a river right revolution malfunction.

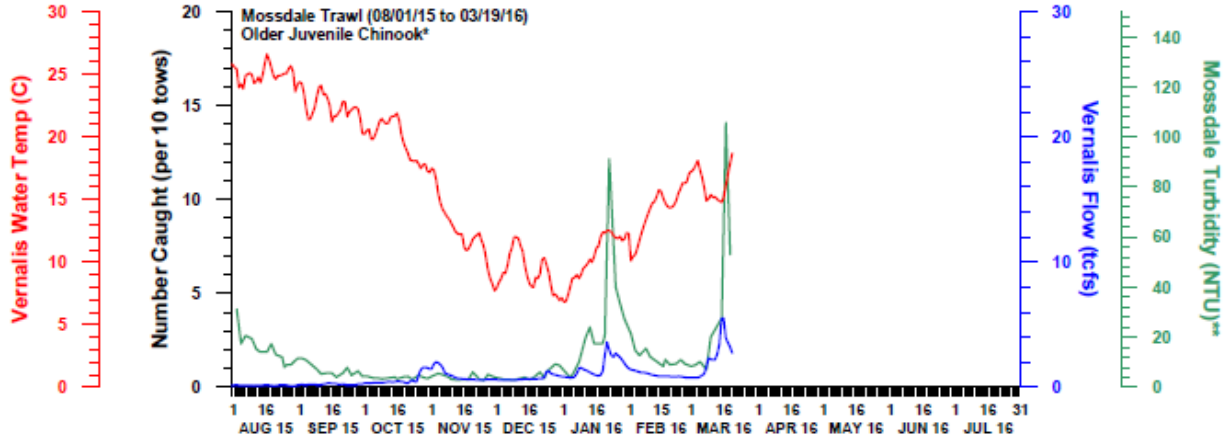
NUMBER OF UNMARKED OLDER JUVENILE CHINOOK MEASURED IN THE LOWER SACRAMENTO RIVER AND CHIPPS ISLAND

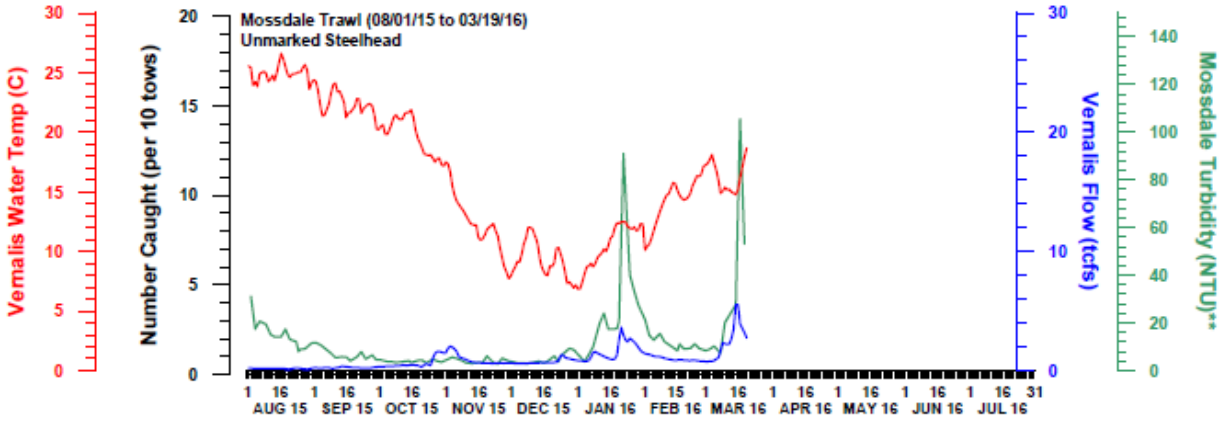


DWR-DES 22 MARCH 2016
Preliminary data from DFW, FWS, and CDEC; subject to revision.

*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Frank Fisher Model) for which a race is assigned on a given sampling date.
**Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days. Knights Landing turbidity measured in FTU, which should be roughly equivalent to NTU.
***Sacramento area seine route consists of the following seine sites: Verona, Elkhorn, Sand Cove, Discovery Park, American River, Miller Park, Sherwood Harbor, and Garcia Bend. Bars are stacked if Chinook caught from the trawl and seines are from the same day.

NUMBER OF UNMARKED OLDER JUVENILE CHINOOK AND STEELHEAD MEASURED IN THE SAN JOAQUIN RIVER

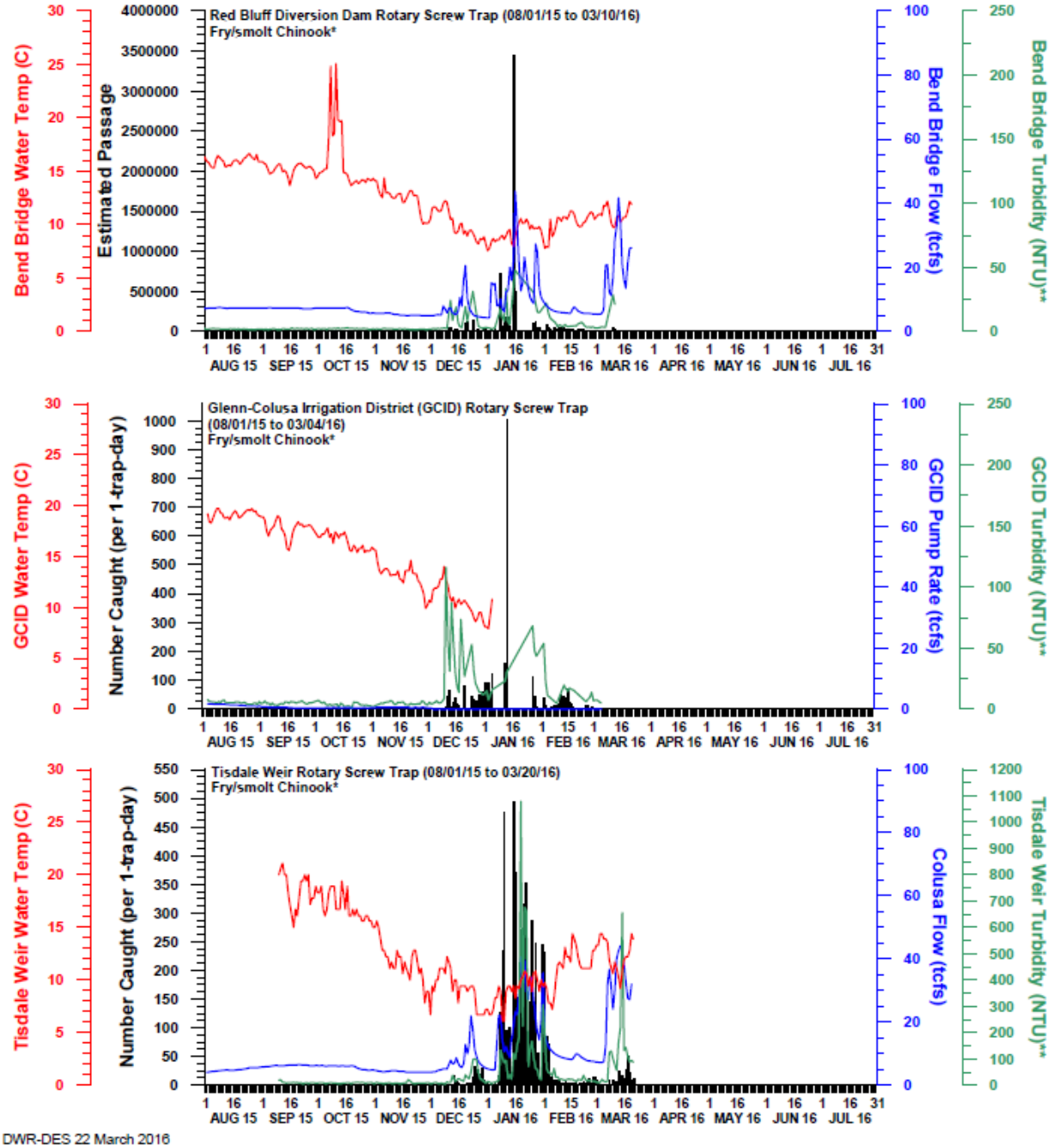




DWR-DES 22 MARCH 2016
Preliminary data from FWS and CDEC; subject to revision.

*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Frank Fisher model) for which a race is assigned on a given sampling date.
**Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.

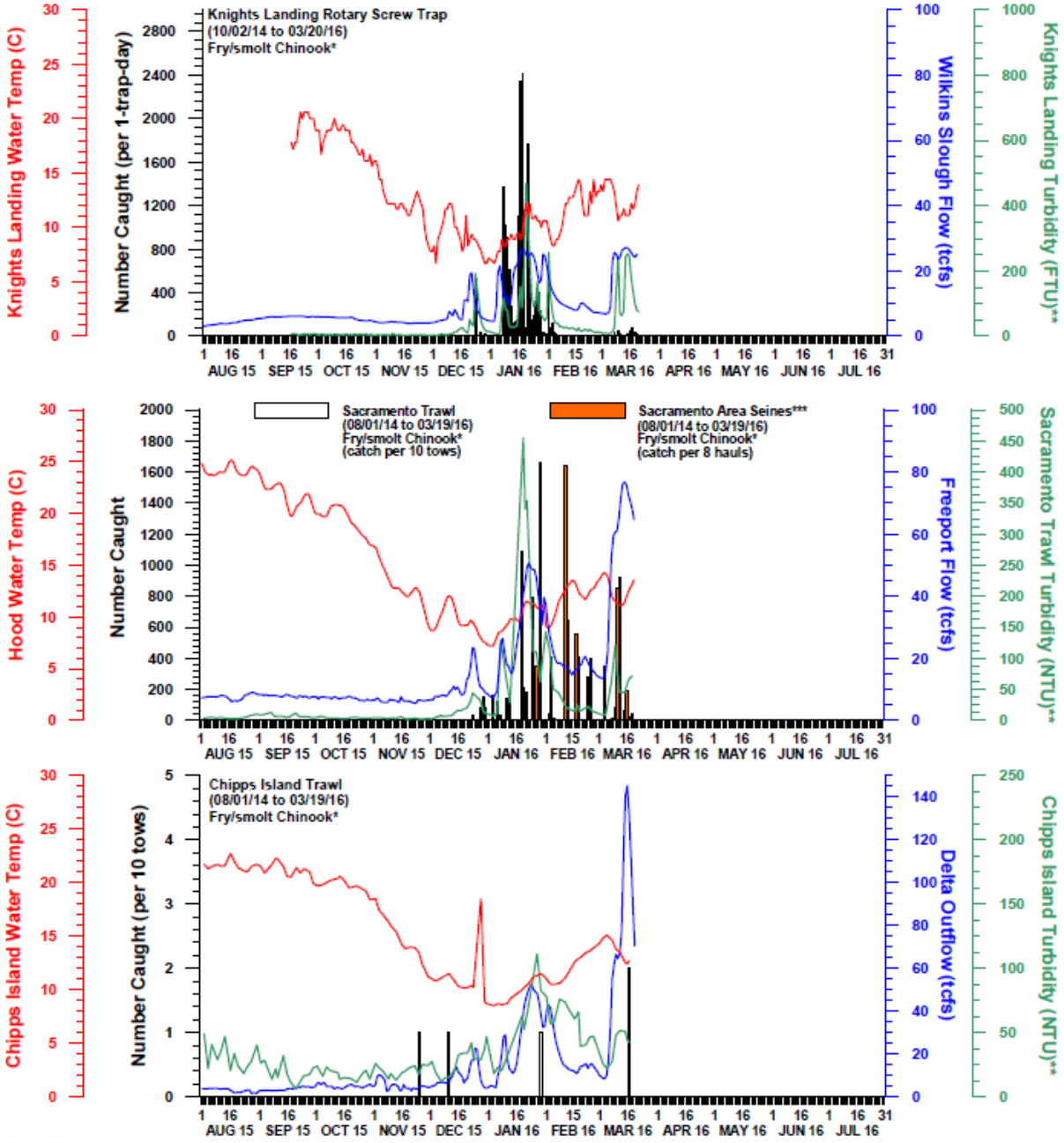
NUMBER OF UNMARKED FRY/SMOLT CHINOOK MEASURED IN THE SACRAMENTO RIVER



DWR-DES 22 March 2016
Preliminary data from DFW, FWS, GCID, and CDEC; subject to revision.

*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Frank Fisher model).
**Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.

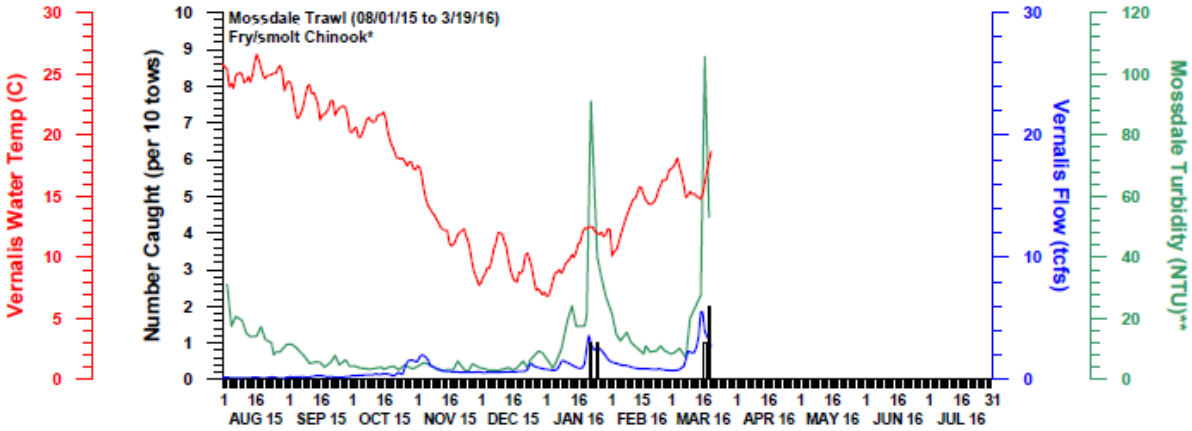
NUMBER OF UNMARKED FRY/SMOLT CHINOOK MEASURED IN THE LOWER SACRAMENTO RIVER AND CHIPPS ISLAND



DWR-DES 22 MARCH 2016
Preliminary data from DFW, FWS, and CDEC; subject to revision.

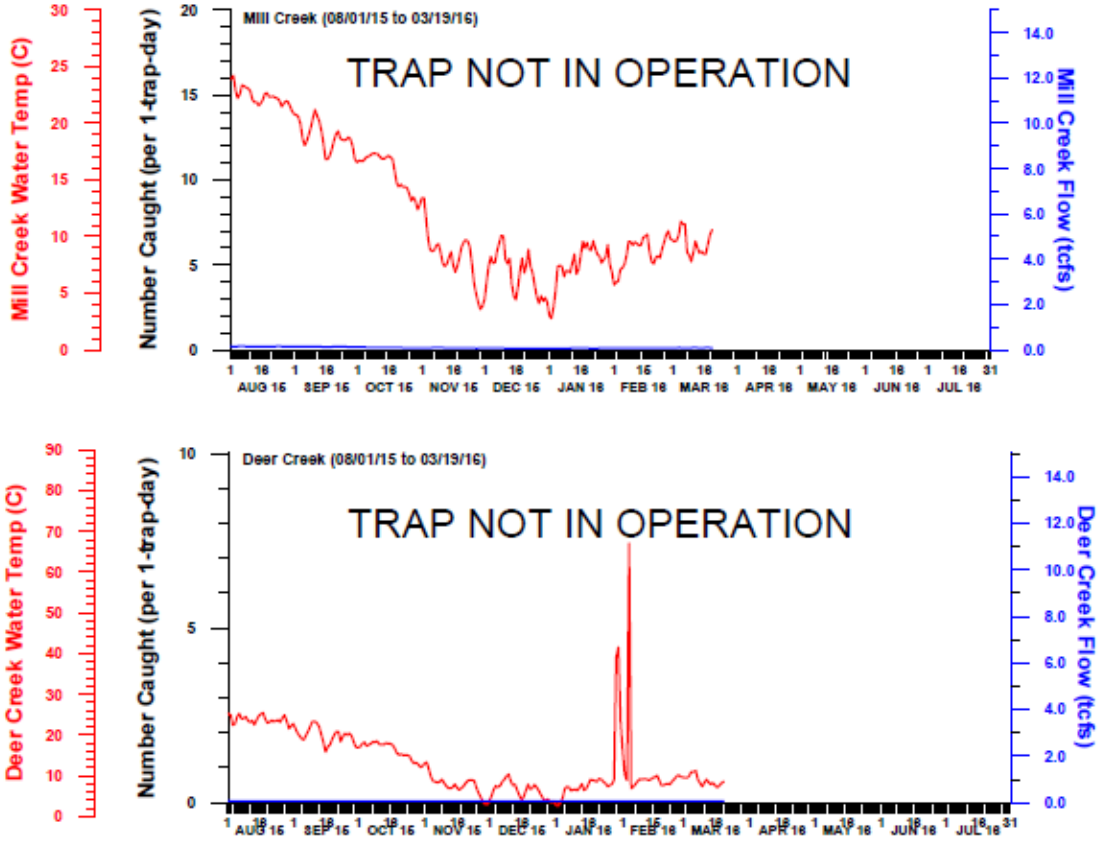
*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Frank Fisher model).
**Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days. Knights Landing turbidity measured in FTU, which should be roughly equivalent to NTU.
***Sacramento area seine route consists of the following seine sites: Verona, Elkhorn, Sand Cove, Discovery Park, American River, Miller Park, Sherwood Harbor, and Garcia Bend. Bars are stacked if Chinook caught from the trawl and seines are from the same day.

NUMBER OF UNMARKED FRY/SMOLT CHINOOK MEASURED IN THE SAN JOAQUIN RIVER



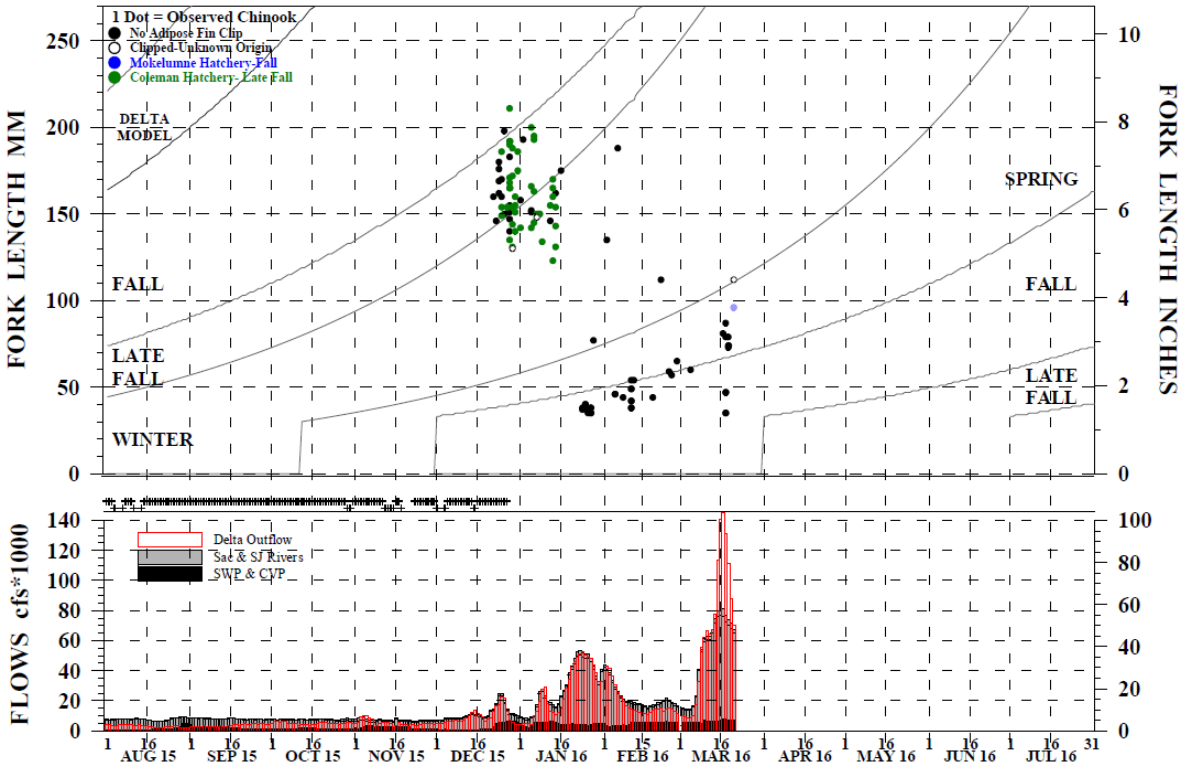
DWR-DES 22 MARCH 2016
Preliminary data from FWS and CDEC; subject to revision.
*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Frank Fisher model).
**Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.

WATER TEMPERATURE AND FLOW MEASURED AT MILL AND DEER CREEK



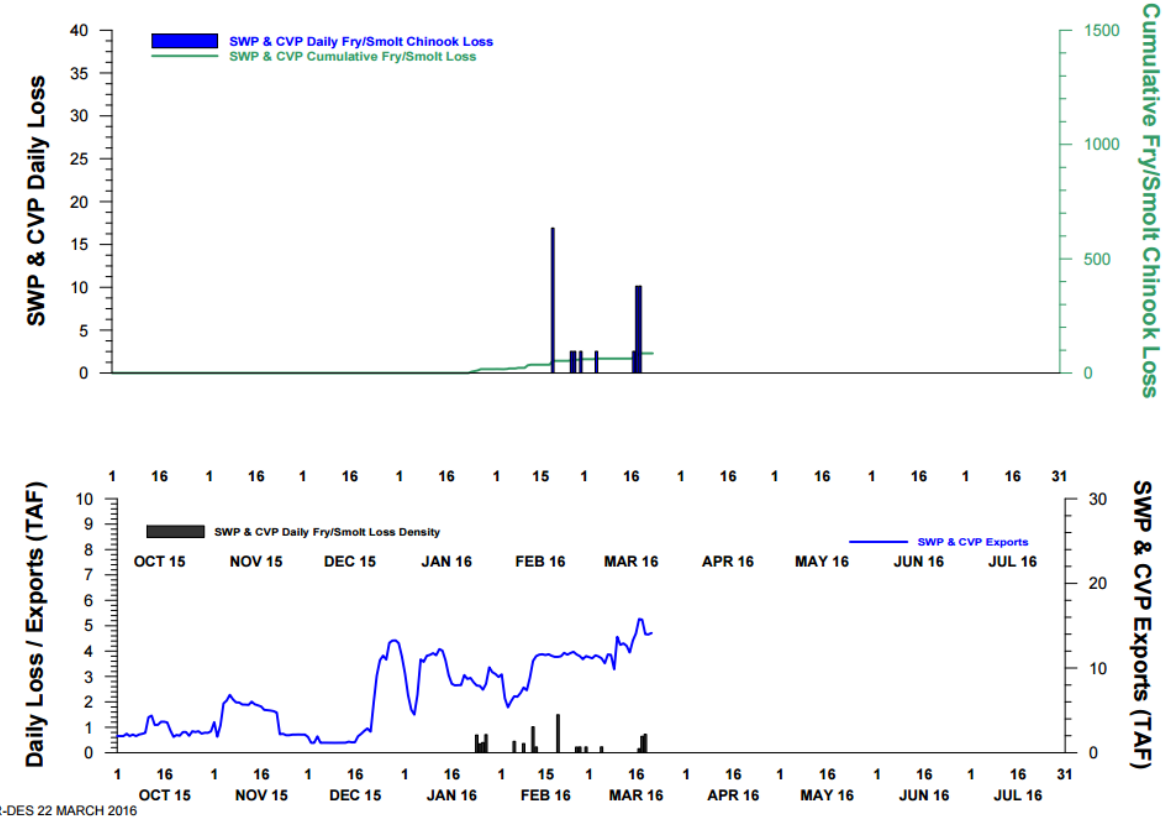
DWR-DES 22 MARCH 2016
Preliminary data from CDEC; subject to revision.

OBSERVED CHINOOK SALVAGE AT THE SWP & CVP DELTA FISH FACILITIES 08/01/2015 THROUGH 03/21/2016



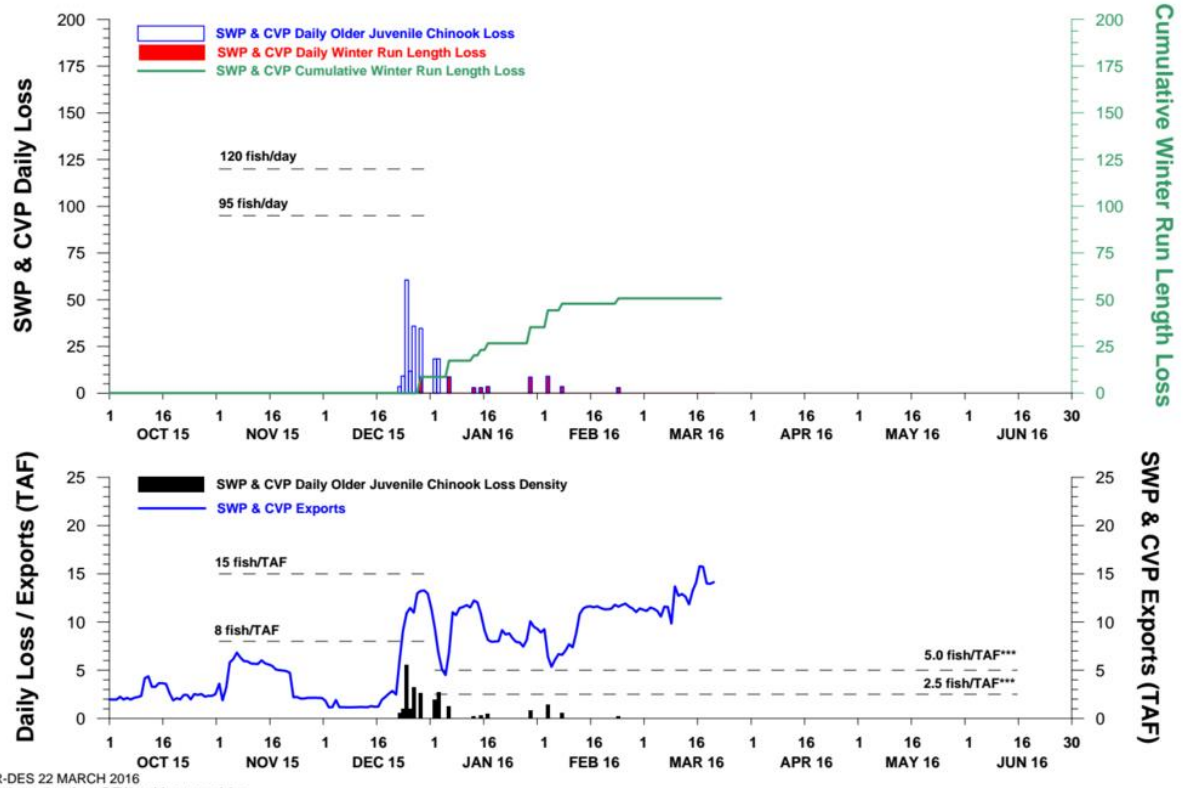
DWR-DES 22 MARCH 2016
Preliminary data from DFW, DWR, FWS, Reclamation, and CDEC; subject to revision.
*Chinook not measured for length and Chinook outside of the length-at-date criteria (Delta model) are not reported.

NON-CLIPPED FRY/SMOLT CHINOOK LOSS AT THE DELTA FISH FACILITIES 01 OCT 2014 THROUGH 20 MARCH 2016



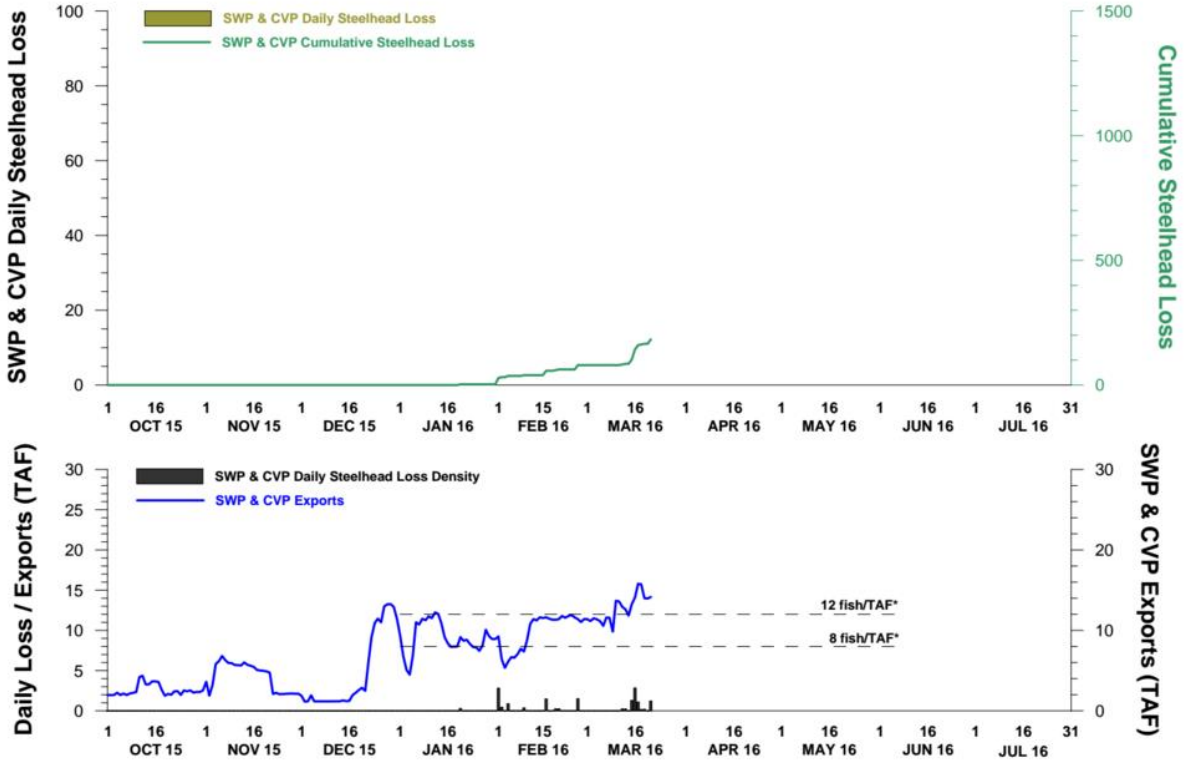
DWR-DES 22 MARCH 2016
Preliminary data from DFW; subject to revision.
*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Delta model).

NON-CLIPPED WINTER RUN & OLDER JUVENILE CHINOOK LOSS AT THE DELTA FISH FACILITIES 01 OCT 2015 THROUGH 20 MARCH 2016

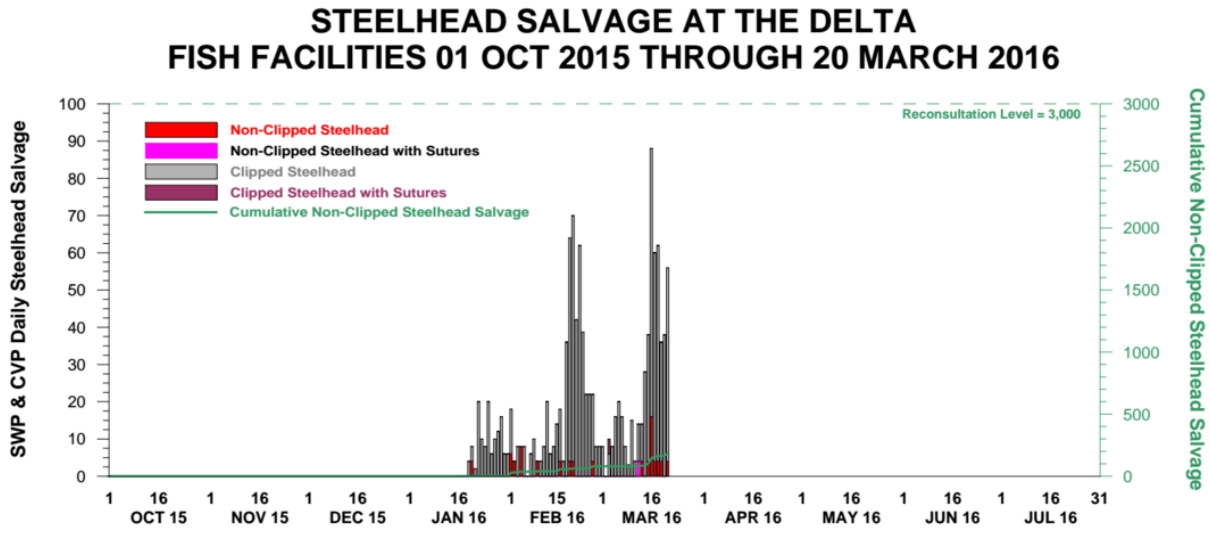


DWR-DES 22 MARCH 2016
Preliminary data from DFW; subject to revision.
*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Delta model) for which a race is assigned on a given sampling date.
**ITL(Incidental Take Limit) is based on the JPE, which is not yet available.
***minimum value determined by NMFS

NON-CLIPPED STEELHEAD LOSS AT THE DELTA FISH FACILITIES 01 OCT 2015 THROUGH 20 MARCH 2016



DWR-DES 22 March 2016
Preliminary data from DFW; subject to revision.
*Used to roughly estimate whether the daily loss is greater than 8 fish/TAF multiplied by the volume exported in TAF or 12 fish/TAF multiplied by the volume exported in TAF.



DWR-DES 22 MARCH 2016
Preliminary data from DFW; subject to revision.